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Patent
Case No.: 57254US002

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor: CLARK, JOHN C.
Application No.: 09/997082 Group Art Unit: 1771
Filed: November 28, 2001 Examiner: Piziali, Andrew T.
Title: FUEL CELL GAS DIFFUSION LAYER COATING PROCESS AND TREATED
ARTICLE

BRIEF ON APPEAL

Mail Stop: Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

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JANUARY 10, 2005
Date

Signed by: Philip Dahl

Dear Sir:

This is an appeal from the Office Action mailed on September 29, 2004, finally rejecting claims 10-19.

A Notice of Appeal in this application was mailed on November 8, 2004, and was received in the USPTO on November 8, 2004.

The fee required under 37 CFR § 41.20(b)(2) for filing an appeal brief should be charged to Deposit Account No. 13-3723.

Appellants request the opportunity for a personal appearance before the Board of Appeals to argue the issues of this appeal. The fee for the personal appearance will be timely paid upon receipt of the Examiner's Answer.

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REAL PARTY IN INTEREST

The real party in interest is 3M Company (formerly known as Minnesota Mining and Manufacturing Company) of St. Paul, Minnesota and its affiliate 3M Innovative Properties Company of St. Paul, Minnesota.

RELATED APPEALS AND INTERFERENCES

Appellants are unaware of any related appeals or interferences.

STATUS OF CLAIMS

Claims 1-19 are pending. Claims 1-9 are withdrawn. Claims 10-19 stand rejected..

STATUS OF AMENDMENTS

No amendments have been filed after the final rejection.

CONCISE EXPLANATION OF THE CLAIMED INVENTION

The claims at issue concern a hydrophobic carbon fiber construction made by a method comprising the steps of:

- a) immersing a carbon fiber construction in an aqueous dispersion of a highly fluorinated polymer;
- b) contacting said dispersion with a counterelectrode; *and*
- c) *electrophoretically depositing said highly fluorinated polymer on said carbon fiber construction by applying electric current between said carbon fiber construction and said counterelectrode.*

The method may comprise an additional step of: d) sintering said highly fluorinated polymer by heating said carbon fiber construction.

The resulting hydrophobic carbon fiber construction may be coated with a monolayer of particles of the highly fluorinated polymer.

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CONCISE STATEMENT OF THE ISSUES PRESENTED FOR REVIEW**First Issue**

Claims 10-16, 18 and 19 stand rejected under 35 USC § 102(e) as purportedly anticipated by US 6,331,224 (Seko).

Second Issue

Claim 17 stands rejected under 35 USC § 103(a) as purportedly unpatentable over Seko in view of any one of US 6,723,464 (Tabata), US 6,713,424 (Stumper) US 6,350,423 (Aoyama) or US 6,127,058 (Pratt).

ARGUMENT**First Issue**

Claims 10-16, 18 and 19 stand rejected under 35 USC § 102(e) as purportedly anticipated by US 6,331,224 (Seko).

The present claims recite a hydrophobic carbon fiber construction made according to a method comprising the steps of:

- "a) immersing a carbon fiber construction in an aqueous dispersion of a highly fluorinated polymer;
- b) contacting said dispersion with a counterelectrode; and
- c) *electrophoretically depositing said highly fluorinated polymer on said carbon fiber construction by applying electric current between said carbon fiber construction and said counterelectrode.*"

As the Office Action notes, Seko teaches "a process comprising immersing a carbon fiber construction . . . in an aqueous dispersion of highly fluorinated polymer (PTFE), drying . . . and heating (sintering) . . ." (Office Action at page 3.) However, the Office action questions whether the product of the process recited in the present claims is distinguished from the product of the Seko process.

At the outset, Applicants note that both the process described in Seko and the process of the present invention include a step of immersing a carbon fiber construction in an aqueous dispersion of highly fluorinated polymer. The process of the present invention requires the additional step of applying electric current between the carbon fiber construction and a counterelectrode to electrophoretically deposit the highly fluorinated polymer on the carbon fiber construction. If the

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products of the two processes were not distinguishable, this added step would be superfluous. However, the product according to the present invention has distinct and much improved characteristics, as addressed numerous places in the Specification, including in Examples 1 and 2C.

Examples 1 and 2C represent a side-by-side comparison of processes performed with (Ex. 1) and without (Ex. 2C) the electrophoretic deposition step. Figs. 1 and 2 are electron micrographs of the actual product of Example 1. Figs. 3 and 4 are electron micrographs of the actual product of Example 2C. As noted in the Specification (e.g. at p. 5, ln. 25 et seq.), the fluoropolymer coatings produced according to the method of the present invention are uniquely uniform. In Figs. 1 and 2 it can be seen that the particles of fluoropolymer form a monolayer on the surface of the fibers. In contrast, Figs. 3 and 4 reveal clumped fluoropolymer particles and large uncoated areas on many fibers of the Ex. 2C product. As the Specification notes: "Without wishing to be bound by theory, it is believed that the method according to the present invention forces a uniform distribution of fluoropolymer because of the insulating nature of the coating." (p. 6, lns. 1-4).

Claims 11-19 each add additional features to claim 10. In particular, claims 12-19 each recite that the hydrophobic carbon fiber construction "is coated with a monolayer of particles of a highly fluorinated polymer." Claim 10 is patentable for the reasons given above. Thus, claims 11-19 are likewise be patentable.

Applicants assert that the rejection of claims 10-16, 18 and 19 under 35 USC § 102(e) should be reversed.

Second Issue

Claim 17 stands rejected under 35 USC § 103(a) as purportedly unpatentable over Seko in view of any one of US 6,723,464 (Tabata), US 6,713,424 (Stumper) US 6,350,423 (Aoyama) or US 6,127,058 (Pratt).

Claim 17 depends from claim 10, addressed above, and adds the additional limitation that "said carbon fiber construction is a woven carbon fiber construction." Claim 17 is patentable over Seko for all of the reasons given above in regard to claim 10. The additional references cited in this rejection are not cited to correct the shortcomings of Seko in regard to claim 10. Thus, claim 17 is patentable over the cited references.

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Applicants assert that the rejection of claim 17 under 35 USC § 103(a) should be reversed.

CONCLUSION

For the foregoing reasons, appellants respectfully submit that the Examiner has erred in rejecting this application. Please reverse the Examiner on all counts.

Respectfully submitted,

January 10, 2005

Date

By: 

Philip Y. Dahl, Reg. No.: 36,115
Telephone No.: (651) 737-4029

Office of Intellectual Property Counsel
3M Innovative Properties Company
Facsimile No.: 651-736-3833

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CLAIMS APPENDIX

1. (Withdrawn) A method of making a hydrophobic carbon fiber construction comprising the steps of:
 - a) immersing a carbon fiber construction in an aqueous dispersion of a highly fluorinated polymer;
 - b) contacting said dispersion with a counterelectrode; and
 - c) electrophoretically depositing said highly fluorinated polymer on said carbon fiber construction by applying electric current between said carbon fiber construction and said counterelectrode.
2. (Withdrawn) The method according to claim 1 wherein said highly fluorinated polymer is selected from the group consisting of polytetrafluoroethylene (PTFE), fluorinated ethylene propylene (FEP), perfluoroalkyl acrylates, hexafluoropropylene copolymers, and tetrafluoroethylene/hexafluoropropylene/vinylidene fluoride terpolymers.
3. (Withdrawn) The method according to claim 1 wherein said highly fluorinated polymer is polytetrafluoroethylene (PTFE).
4. (Withdrawn) The method according to claim 1 wherein said carbon fiber construction is a woven carbon fiber construction.
5. (Withdrawn) The method according to claim 1 wherein said carbon fiber construction is a non-woven carbon fiber construction.
6. (Withdrawn) The method according to claim 1 wherein said step of electrophoretically depositing said highly fluorinated polymer has a duration of not more than 30 minutes.
7. (Withdrawn) The method according to claim 1 wherein said step of electrophoretically depositing said highly fluorinated polymer has a duration of not more than 15 minutes.

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8. (Withdrawn) The method according to claim 1 wherein said electric current is applied at a voltage of between 6 and 100 volts.
9. (Withdrawn) The method according to claim 1 additionally comprising the step of: d) sintering said highly fluorinated polymer by heating said carbon fiber construction.
10. (Original) The hydrophobic carbon fiber construction made according to the method of claim 1.
11. (Original) The hydrophobic carbon fiber construction made according to the method of claim 9.
12. (Original) The hydrophobic carbon fiber construction according to claim 10 which is coated with a monolayer of particles of a highly fluorinated polymer.
13. (Original) The hydrophobic carbon fiber construction according to claim 11 which is coated with a monolayer of particles of a highly fluorinated polymer.
14. (Original) A hydrophobic carbon fiber construction coated with a monolayer of particles of a highly fluorinated polymer.
15. (Original) The hydrophobic carbon fiber construction according to claim 14 wherein said highly fluorinated polymer is selected from the group consisting of polytetrafluoroethylene (PTFE), fluorinated ethylene propylene (FEP), perfluoroalkyl acrylates, hexafluoropropylene copolymers, and tetrafluoroethylene/hexafluoropropylene/vinylidene fluoride terpolymers.
16. (Original) The hydrophobic carbon fiber construction according to claim 14 wherein said highly fluorinated polymer is polytetrafluoroethylene (PTFE).
17. (Original) The hydrophobic carbon fiber construction according to claim 14 wherein said carbon fiber construction is a woven carbon fiber construction.

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18. (Original) The hydrophobic carbon fiber construction according to claim 14 wherein said carbon fiber construction is a non-woven carbon fiber construction.

19. (Original) The hydrophobic carbon fiber construction according to claim 14 wherein said particles of a highly fluorinated polymer are sintered.

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EVIDENCE APPENDIX

Appellants rely on Examples 1 and 2C and Figs. 1-4 of the present Specification, as noted in the Argument above.

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RELATED PROCEEDINGS APPENDIX

None.

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